making successful efforts to provide elementary education, but this does not excuse it for the almost total neglect of the health of the Eskimos.

On the contrary, as is well known, the importation of reindeer has proved a great success. Congress appropriated $300,000 to buy them; and their progeny, now in Alaska, are estimated to be worth $3,000,000.

The author's circuit is shown on an outline map of Alaska. He also reproduces Leffingwell's map (*U. S. Geol. Survey Professional Paper 109*, 1919) and pays tribute to the fine work that Leffingwell accomplished in the careful triangulation of this northern coast, "for which he must always be remembered in the annals of geography."

CYRUS C. ADAMS

HISTORY OF THE BIOGEOGRAPHICAL PROBLEM OF DISCONTINUOUS DISTRIBUTION

NILS VON HOFSTEN. **Zur älteren Geschichte des Diskontinuitätsproblems in der Biogeographie.** Index. Reprint from *Zool. Annalen*, Vol. 7, 1916, pp. 197–353. Würzburg.

This essay on the theories of the discontinuous distribution of plants and animals is limited to the living world and does not consider the life of the past ages. The presentation is clearly and interestingly written by a biologist along historical lines. It begins with the theories of the Greeks as set forth by Hippocrates and Aristotle, who thought the distribution to be due to differences in the local climates, and follows the more essential ideas down to the present time. For a while the church stimulated this research because of the riddle of the wide distribution and variability of man, but in the end it fought the conclusions of the naturalists.

Modern views began with the discovery of America, with its plants and animals which are different from those of Europe. Some continued to explain this difference by special local creations, and in fact Louis Agassiz (1850–1859) held to the creation theory to the end of his life. Buffon (1749–1756) is sometimes regarded as the originator of modern views in regard to biogeography. The way was further indicated by Cuvier (1815), Lyell (1830–1833), Heer (1845), and Forbes (1846) and was modernized by Hooker, De Candolle, Darwin, and Wallace. Now we know that the organisms are where they are because of local genetic developments out of antecedent stocks, conditioned by their variable dispersion and evolution along varying routes of travel and climate, and that this variation was brought about in the main by the geologic changes in the configuration of the land surfaces and their oceanic boundaries.

CHARLES SCHUCHERT

ROCK STRUCTURE AND LANDSCAPE FORM

KARL SAPPER. **Geologischer Bau und Landschaftsbild.** vi and 208 pp.; ills., index. *Die Wissenschaft*, Vol. 61. Friedr. Vieweg & Son, Brunswick, 1917. M. 7.20. 9 x 6 inches.

This semi-popular book, the outgrowth of lectures delivered in 1916, is the work of an experienced explorer in tropical America, Australasia, and elsewhere, who was professor of geography at the German university of Strassburg for several years up to the end of the war and who was then transferred to Würzburg. The first half of the book discusses the interaction of underground structures and surface processes in the production of the manifold landscapes of the earth; the second half is occupied with generalized descriptions of various types of landscape as affected by climate.

The first half is novel in some respects, as in giving in the introductory pages brief accounts of the odors and sounds that are associated with certain landscapes and in detailing the changes of landscape appearance under varying illumination, as at morning, noon, and evening, in clear and in stormy weather, in winter and in summer. The motive here seems to be to call attention to items that are commonly overlooked. But when we read in one passage that the chief source of illumination is the sun, by which the moon as well as the earth is lit up; in another that the change from day to night affords the maximum contrast of light and darkness; in a third that among other sources of terrestrial illumination are the aurora borealis, volcanic eruptions, lightning, and prairie fires (shooting stars are omitted); and in a fourth that fireflies and burning natural gas are generally too faint

to light up the landscape, the question arises whether the enumeration of such matters is a mark of originality and profundity or merely of perseverance.

The systematic discussion of landscapes divides their elements into inorganic and organic groups; but instead of the natural order of arrangement which assigns first treatment to the inorganic elements, because they constitute the environment in which most of the organic elements have their being, we find the organic elements are here given precedence. Perhaps as a result of this order of presentation, organic forms are not clearly treated as conditioned by the inorganic; there is not sufficient emphasis given to the relationships that exist between the earth and its inhabitants, although such relationships are of the highest significance in actual landscapes. Instead, various relatively trivial items are here again instanced, such as the spray spouted by whales at sea. The harmless statement that "Perhaps nothing affects the beauty of a landscape more than vegetation" is regarded as of sufficient originality to be credited to its author, Masius H. Wagner, who is quoted as having calculated (he must have had much time to spare) that if the plants of the earth were evenly distributed over its entire surface they would form a layer 4.4. mm. in thickness, to which the animals would add 0.5 mm. But no reference is made to the important studies made by American and other ecologists concerning the slowly flowing adjustment of floras and faunas to the gradual change of surface forms in a down-wearing land area, although the principles thus established are as beautiful as they are significant. Surely these principles are more important than Wagner's calculations; they cannot be omitted if landscapes are to be appreciatively studied.

In the chapters on land forms, the attempt is made to treat them in a broad philosophical manner. Constructional forms are first described, and the effect of erosion in modifying them is then introduced; but the discussion is so incomplete that few clear ideas can be gained by readers not already familiar with the subject. As if conscious of this deficiency, the author offers a delusive excuse for not assuming fuller responsibility for an explanatory treatment; namely, that the book is not concerned with theoretical analyses. But in reality the results of theoretical analyses, and for the most part of good analyses as far as they go, are found on many pages. For example, in treating of the transformation of initial forms of disorderly structure into their derivatives, the author points out that, even after the down-wearing of such masses to an almost level surface, the direction of rivers and of "many other features" will still reveal the attitude of the underlying rocks (p. 57). Exception need not be taken to the manifestly theoretical nature of this statement, but only to its vagueness, for inquiring readers will be dissatisfied not to know how it happens that river courses on worn-down surfaces indicate underground structure, and not to know what kinds of other features give similar testimony.

The more serious aspect of Sapper's delusion as to his method of discussion not being theoretical is that, like those untrained "practical" persons who complacently assure us that they do not theorize, he fails to distinguish between safe and unsafe theoretical conclusions. Thus reference is made to the plains of Russia (p. 43) as if they departed from their initial form only by the incision of valleys, and the Jura mountains are cited on three different pages (pp. 33, 46, 49) as if they were but little modified by erosion since their folding; yet evidence has been brought forward, by Philippson and Brückner among others, which shows that both the Russian plains and the Jura anticlines are now in a fairly advanced stage of a second cycle of erosion, following peneplanation in an earlier cycle. In spite of the title of the book, its first half, in frequently failing to give the reader a clear understanding of visible land forms, does not embody the essence of what Passarge very well calls *Landschaftskunde*, "a new branch of geography that has at last secured for itself the place that it should have taken long ago" (Beschreibende Landschaftskunde, 1919, p. 1).

Another curious characteristic of Sapper's method is a mistrust of the indispensable mental faculty of deduction as an aid in reaching an understanding of land forms. The mistrust is expressed in several homilies, which intimate that not enough is yet known about the manner of action of various external processes upon various underground structures to make it possible in all cases to use the deductive method safely. There cannot be two opinions about these "safety first" generalities, for physiographic research has surely not yet solved all its problems. For that very reason the important thing for every physiographer to do is to try to carry forward the investigation of land forms, inductively and deductively, toward more and more assured results.

The negating quality of treatment exhibited in the unsuccessful effort to exclude theoretical analyses and deductive explanations is encountered again in an attempted exclusion of

explanatory terms, that give indication of the origin of land forms, in favor of neutral terms that give no such indication; yet frequent use is made of such terms as volcano, landslide, moraine, and various others which have the origin of the forms that they designate embedded in them. And a similar negating quality is seen in the condemnation of block diagrams because, as vegetation is ordinarily not indicated upon them, they might be taken to represent desert landscapes; yet no unfavorable comment is made on the use of mere profiles or structural sections, such as are found in Richthofen's "Führer" or in Penck's "Morphologie," although such figures are much less helpful to the uninformed reader than even rudely drawn block diagrams, in which structure, profile, and surface are all indicated. Sapper solves the diagram question for his own book handily enough by having no diagrams at all, thus leaving his readers to make out his meaning from the text alone as best they can.

As already noted, the second half of Sapper's book, which describes eight climatic types of landscape, is easier and better reading than the first half, because the author here presents for the most part general descriptions, in which he succeeds, and gives but secondary attention to systematic explanations, for which he is apparently less qualified. The eight types are: humid tropical, open tropical, subtropical desert, moist temperate, dry temperate, high mountains of middle or low latitudes, subpolar and polar, and sea and coastal landscapes. The examples presented are well chosen, but the implication that certain classes of structure are associated with certain types of climate may mislead the reader. Here, as in the first part of the book, it is curious to note that, with very few exceptions, no authors or observers other than Germans are cited. Whether this is because the university library at Strassburg was poorly stocked with geographical books, or whether it is a consequence of nationalistic introspection during the Great War cannot be told.

W. M. DAVIS

THE PHYSIOLOGICAL EFFECT OF THE AIR ON THE HUMAN BODY

C. W. B. NORMAND. **The Effect of High Temperature, Humidity, and Wind on the Human Body.** Diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 193, Vol. 46, 1920, pp. 1–14 (discussion, pp. 12–14). London.

The deadliness of the simoon has long been a source of speculation, but now the question appears conclusively solved. It is neither the high temperature alone that kills nor the strong dust-filled wind that suffocates, but the two in combination, which brings more heat to the human body than it can lose even though exerting its maximum powers of providing for evaporation. The author presents a detailed discussion of the katathermometer with a wetted surface and of the ordinary wet-bulb thermometers as indicators of possible limits of human life under different conditions of temperature, humidity, and wind velocity. The wet-bulb thermometer constantly supplied with moisture is taken as the better index of human responses. With a certain maximum rate of provision of moisture for evaporation there comes a limiting temperature above which, no matter how dry the air is, the temperature of the wet bulb can no longer be maintained at blood heat by evaporative cooling. The stronger the wind, the lower this limiting temperature is. As there is a limit to the amount of water the human body can supply for evaporation in a given time, the stronger the wind, the lower must be the air temperature if weather conditions are not to prove fatal.

On a calm day 120° F. may be easily endurable under the conditions of extremely low humidity characteristic of a desert in daytime; but if a simoon comes on, even though the wind may actually reduce the temperature by mixing the heated surface air with cooler air above, the air becomes fatal. However, if the face, hands, and feet are buried in the clothing, and the simoon does not last over an hour or two, the reduced wind velocity at the skin and the slow rise of temperature due to body heat and conduction may prevent fatal body temperatures being reached.

Among a group of men some will get heat strokes much sooner than others. This is due to physiological differences and also to local effects of clothing. Heat strokes may come from unbearable heat and humidities over portions of the body poorly ventilated on account of clothing, or through exhaustion of the sweat glands, or derangement of the bodily heat regulatory apparatus.

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